CENTRAL INTELLIGENCE AGENCY

# INFORMATION REPORT



SECRET
SECURITY INFORMATION

| | | | |
|---|---|---|---|
| COUNTRY | USSR (Moscow and Kalinin Oblasts) | REPORT NO. | [redacted] 25X1A |
| SUBJECT | Activities of German Scientists at Branch No. 1 of Zavod 88 on Gorodomlya Island | DATE DISTR. | 5 March 1953 |
| | | NO. OF PAGES | 10 |
| DATE OF INFO. | [redacted] 25X1A | REQUIREMENT NO. | RD |
| PLACE ACQUIRED | [redacted] 25X1C | REFERENCES | [redacted] 25X1A |

THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.
THE APPRAISAL OF CONTENT IS TENTATIVE.
(FOR KEY SEE REVERSE)

25X1X

[redacted]

## General Information

1. German data on the A-4 rocket and the Wasserfall as well as general rocket literature were available as basic working materials for rocket development in Branch 1 of Zavod 88 on Gorodomlya Island, near Ostashkov.

2. The composition of the personnel could be said to be well suited for the tasks assigned.

3. Working capacities were very limited, because of the lack of liaison with other institutes as well as the lack of modernly equipped testing laboratories and measuring instruments. The projects were, therefore, only of theoretical value, particularly since individual parts needed for computation control could be manufactured only in rare instances (See Sketch No. 1).

25X1A

SECRET

| STATE | x | ARMY | x | NAVY | x | AIR Ev | x | FBI | | AEC | | [redacted] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|

(Note: Washington Distribution Indicated By "X"; Field Distribution By "#".)

25X1A



## Supplementary Design Data

25X1X

4. Various valves were designed to meet the demand for a cutoff speed of the propulsion unit with a time precision of ± 2 to 3 ms. Flame baffle experiments were also instituted. [redacted] 25X1X

5. The experiments of Dr. Karl Umpfenbach on gas intake from the chamber to operate the turbine were only partly tested on models. Large-scale tests did not take place. The gas intake took place in the chamber above the combustion zone. By injecting fuel into these gases, the temperature was reduced from 2,500 degrees C to 500-600 degrees C. Experiments were conducted on alcohol-oxygen and petroleum-oxygen bases. The Alpha regulator, designed by Dr. Kurt Magnus, was used as a regulator between the chamber and the turbine. Source is not familiar with any details concerning this regulator. The propulsion units were supposed to be started by compressed air.

6. The G-4 rocket, also called the R-14, was to attain a flight range of 3,000 kilometers. A number of projects were worked out with this end in mind. A large number of the projects were based on the application of an A-4 which was to receive additional A-4 chambers for take-off assistance. For instance, a separable unit consisting of four A-4 chambers was provided. None of these projects was pursued, since a simultaneous ignition of several A-4 chambers did not seem attainable.

7. Another project provided for the new construction of a conical rocket with a chamber of 60 atmospheres absolute pressure. The nose angle of the rocket was to be about 10 to 15 degrees, and the largest diameter at the tail was to be about three meters. The shaping was computed for Mach 10. The 60-atmosphere chamber had a fluid fuel cooling system, which worked at 15 atmospheres absolute pressure. The dividing wall between the cooling and the combustion chamber was kept thin, while the steel outer jacket was to absorb the total pressure. An ordinary jet control was provided. Control on the x- and y-axes took place by the chamber, which was built like a tilting furnace. Control on the z-axis was to be obtained by swiveling exhaust nozzles which were fed by the turbine exhaust gases.

8. Another project provided for a two-stage rocket in which presumably two converted A-4's were to be used. The second stage was supposed to be provided with a vertical chamber (A-4 chamber with extended nozzle). The entire steering and control mechanism was placed in the second stage and from there switched to the first stage. The planning showed that the problem of the ignition of the chamber of the second stage was difficult to solve. 25X1X

9. After discussions about these projects around the beginning of 1950, [redacted] heard no more about further operations or further Soviet plans.

10. Project R-15 was taken care of by Dr. Werner Albring on order of the Soviets. A range of 6,000-10,000 kilometers at an altitude of 15-20 kilometers was required. This two-stage group used an A-4 as the first stage, which was to raise the second stage. The second stage, a ram-jet aircraft with wings and tail unit, was then to be launched in horizontal flight at 600-800 meters per second. The length of this aircraft was between 15 and 20 meters. It had a ram-jet propulsion unit with combustion chamber elements of a Jumo-TL propulsion unit (See Sketch No. 2). The theoretical preliminary operations were conducted by Prof. Helmut Frieser in the hydrodynamic tank. Various suggestions were

25X1A

SECRET [redacted]



made for the controls. The Soviets considered a gyrocontrol unsuitable. An automatic astronavigation was computed. Source did not learn of the results. After a meeting at the beginning of 1950, the Soviets became interested in radio control according to the momentum-hyperbola method. They urgently demanded a second design which was supposed to eliminate disturbances caused by jamming transmitters.

25X1X

11. [redacted]

25X1X

12. [redacted] attempts were being made to obtain control on all three axes by exhaust gas nozzles. Controls installed in jets resulted in high power losses, and swiveling chambers were too complicated to build. [redacted] does not know what results were obtained in these work projects. 25X1X

13. At first the "Emil" component of the German Würzburg apparatus, which happened to be on hand, was used in the experiments started by source in September 1947 in Zavod 88 [NII-88?] for the development of a speed-indicating method for rockets. Later on, the Soviets made available, from US supply, the low-frequency component of an SCR 584. The Doppler effect was measured at about 20 overtones of the pulse recurrence. The experiments could be conducted only in the low-frequency short circuit, since the high-frequency component was not made available to the Germans. Also the group did not receive any magnetron tubes, which would have enabled them to construct a high-frequency component themselves. The reproduction of the speed took place in the usual manner so that the low-frequency phase advancer, installed in the Würzburg apparatus to regulate the control impulse, was put into rotation. The influence of the transmission method was represented only by an attenuator pad. The low-frequency component worked well. However, according to the report of the Soviets who were ordered to carry out these experiments, difficulties occurred when the high-frequency channel and the airborne apparatus were switched on. Source assumes that the difficulties were caused primarily by the fact that the necessary overtones in the airborne apparatus were too strongly suppressed. The release of Bugayev (fnu) in October 1949 was presumably because of the failure of this development.

14. At a meeting of the German group in spring 1950, it was decided to start on the AA rocket project. In this connection, as a counter-proposal, [redacted] 25X1X 25X1X

15. The Markgraf gyroscope is a rate gyroscope, the switching of which was changed as suggested by Mr Markgraf of the Siemens AG. In this rate gyroscope, the displacement of the gyroscope ($\alpha$) is proportional to the rotation velocity ($\varepsilon$) of the controlled body. By means of a gyroscopic moment (M), which counteracts the displacement, the gyroscope is conducted back into the zero position. In the Markgraf gyroscope the resistor (R) is replaced by a condenser (C). In this way, the gyroscopic moment becomes $M \equiv \alpha$. The gyroscope then can no longer be conducted back to its zero position. This would be possible only through a $\alpha$ proportional vane angle, which operates until the rotation $\alpha$ has again become zero (See Sketch No. 5).

16. The reproduction of the Markgraf gyroscope as well as the Askania servo-motor and the Askania servo-motor magnets for Zavod 88 was carried out in other factories unknown to the Germans.

SECRET

17. The entire equipment for radio control of the A-4 was produced in the workshops of Branch 1. The circuits to the DF dipoles were constructed as concentric pipe lines. The contact points which were needed to make possible a rotation of the reflector were carefully constructed and bridged in the usual manner by $\frac{\lambda}{4}$ circuits. The DF switch was constructed of spring sets of German telegraph relays with gold contacts and was operated by a rotary cam plate of 25 revolutions per second. For each of the four DF positions the time of 1/100 second was provided. Through a filter condenser the DF indication received a time constant of 1/4 to 1/5 second. By differentiation, a value proportional to the velocity change of the DF indication which had a time constant of three to five seconds was obtained from the DF indication. From the DF indication and its derivation, the control signal was obtained in the mixing part [control amplifier ?], which was limited in the usual manner (See Sketch No. 4). Since the range required an accuracy of $10^{-3}$, the quadratic velocity included in this value at the time of the cutoff must be given to an accuracy of $5 \cdot 10^{-4}$. With a velocity of 1,500 meters per second, therefore, it must be given to an accuracy of ± 0.75 meters per second. This velocity increase takes place at an acceleration of 5 G's in about 15 ms. Since the larger part of this tolerance of ± 15 ms must be allowed for the mechanical cutoff processes, the required cutoff velocity must be able to be established at an accuracy in time of ± 2-3 ms. The measuring [redacted] 

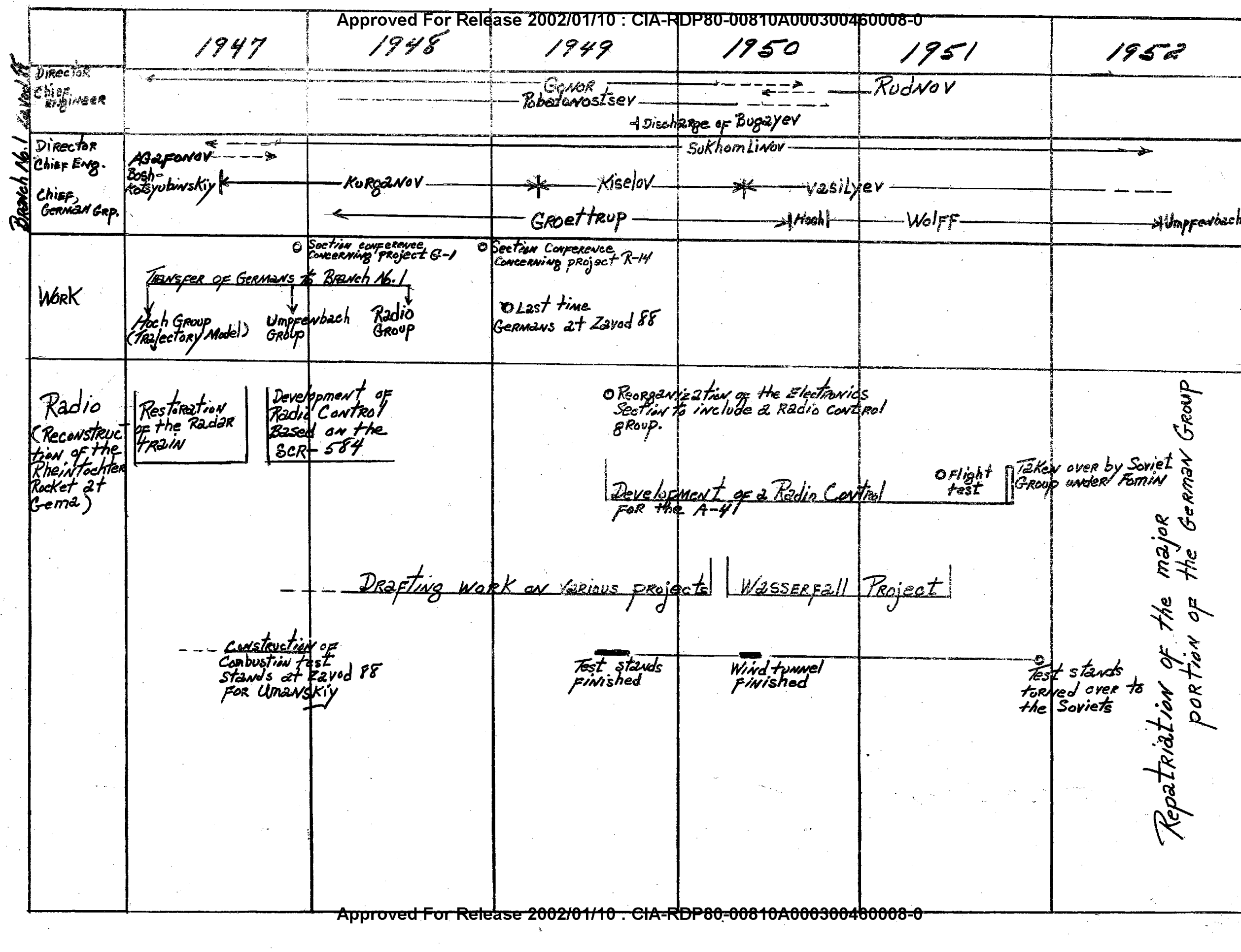
18. Soviet reproductions of the three cathode ray tubes used in the SCR 584 with dichromatic (blue-yellow) reflector (main range tube, range-measuring tube, and tube with the usual deviation in s- and y-direction) were available in Branch 1 from the end of 1950.

19. It was learned at the beginning of September 1952, via letters received from Germans who remained in Ostashkov, that the Soviet director of Branch 1, Fedor Yuliyevich Sukhomlinov, had been recalled. Umpfenbach was appointed head of the remaining German group. All Germans had to give up the positions they held in the institute and work only in the workshop. They were also greatly restricted in regard to freedom of movement.



20. [redacted] the number of employees of Zavod 88 at 500 to 1,000 men. The foundry and various parts of the plant were also working on a night shift.

Sketch No. 1: Personnel and Work Projects of Branch No. 1




SECRET

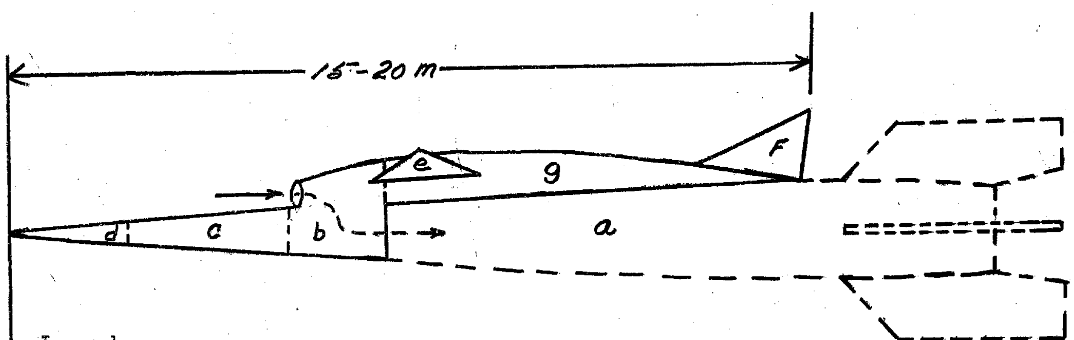
25X1X [redacted]

25X1A

SECRET [redacted]

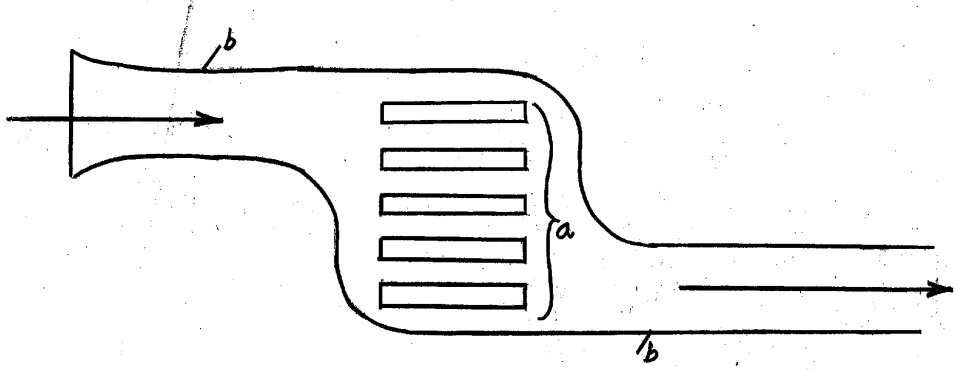


Sketch No. 2 - Diagram of the R-15




Legend:
A. First stage, a normal A-4.
B. Space for the propulsion unit.
C. Explosive charge.
D. Apparatus space.
E. Wings.
F. Rudder.
G. Fuselage for fuel compartment.

Ram Propulsion Unit




Legend:
A. Combustion chamber.
B. Internal motor lining.

not to scale

SECRET

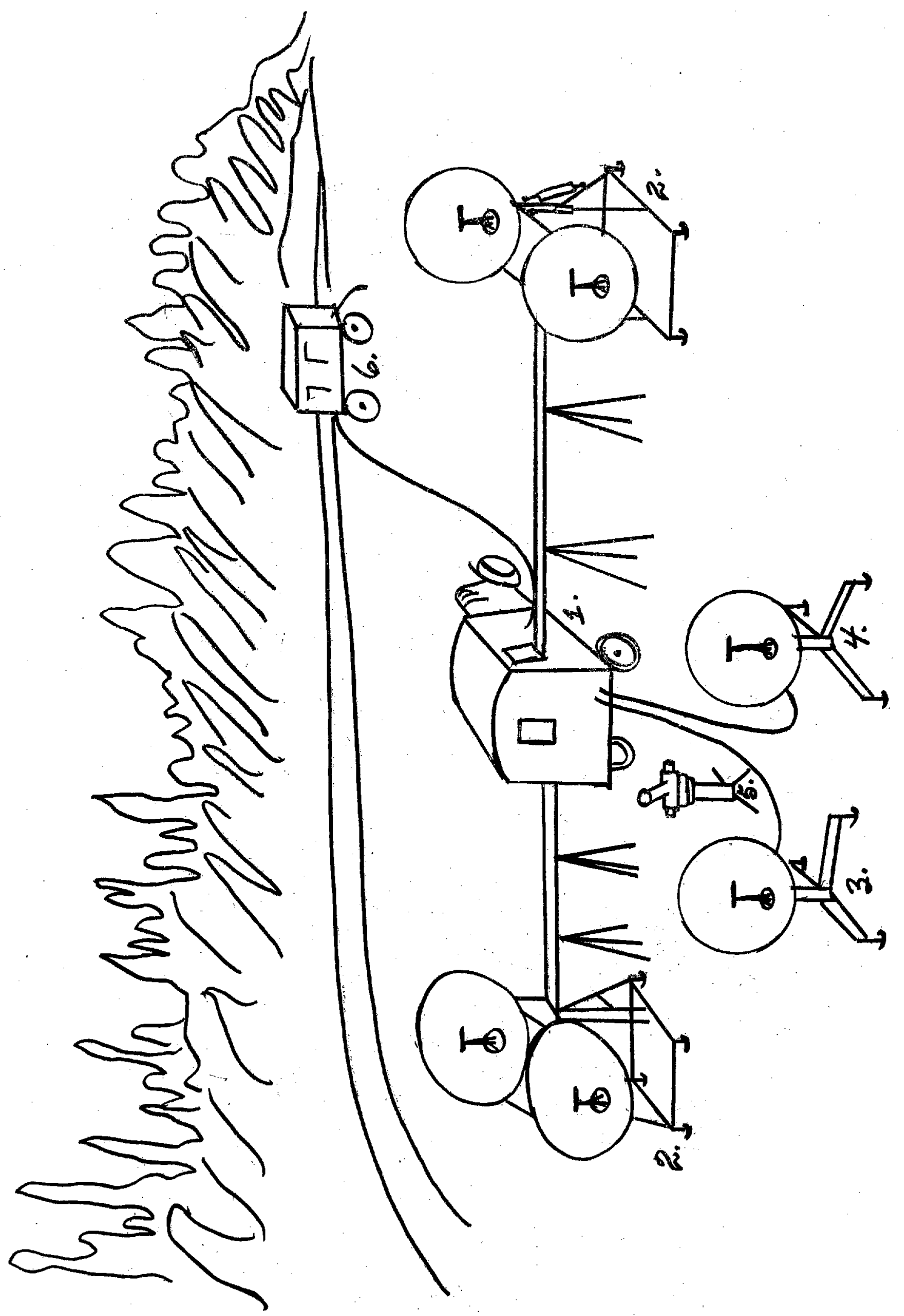
Approved For Release 2002/01/10 : CIA-RDP80-00810A000300460008-0

25X1A

SECRET [redacted]



Sketch No. 3 - Diagram of a Radio Control Station




SECRET

Legend for Sketch No. 3

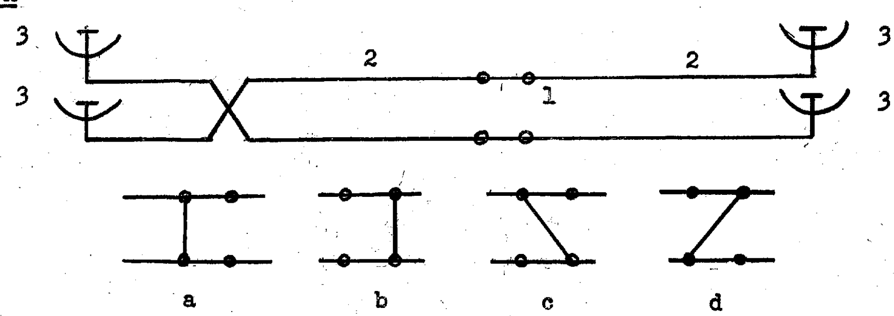
1. Radio truck.
2. Radio DF installation.
3. Transmitting antenna.
4. Receiving antenna.
5. Photo-theodolite.
6. Power unit.

25X1A

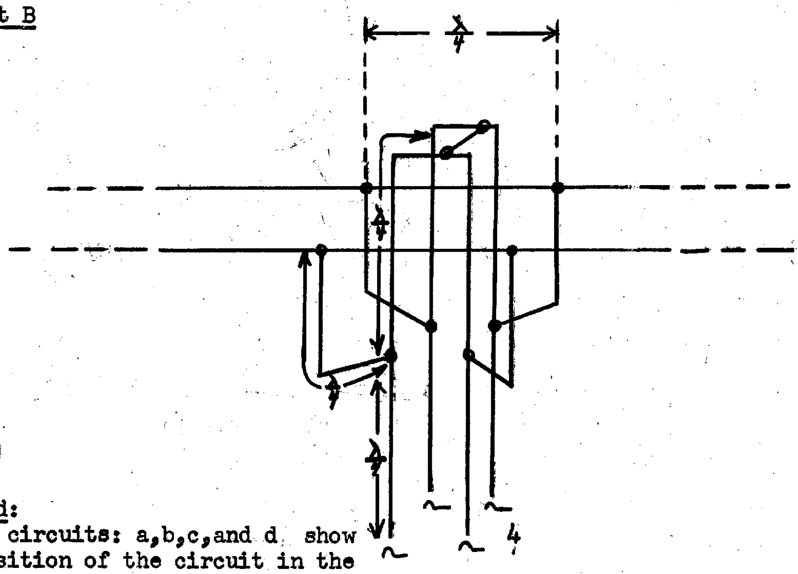


Sketch No. 4 - Circuit Diagram and Construction of the DF Switch

Part A




Part B

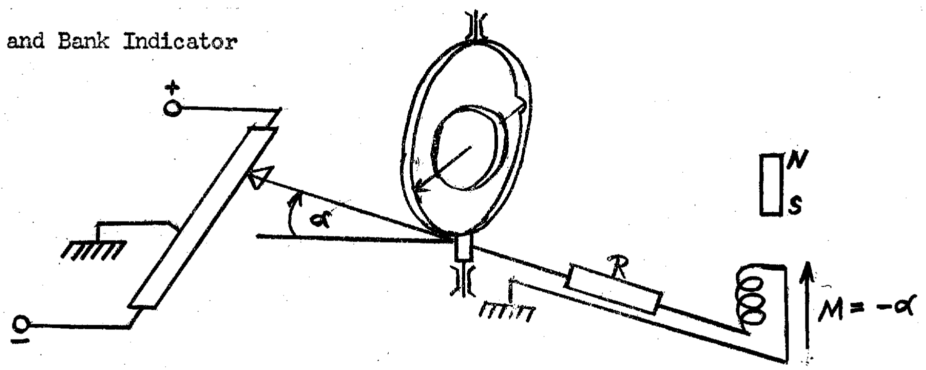



Legend:
1. DF circuits: a,b,c,and d show position of the circuit in the DF installation.
2. Concentric leads.
3. Antenna mirror.
4. Contacts for short circuiting the power terminals.

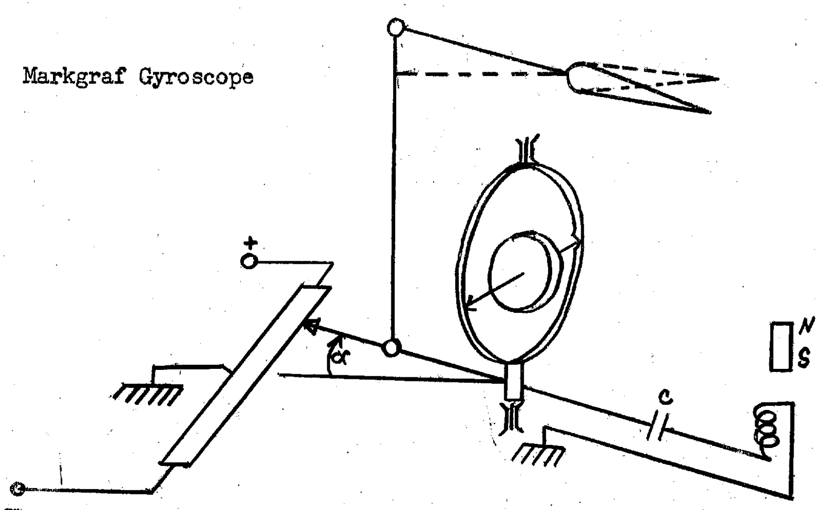
not to scale

Sketch No. 5 - Diagram of the Markgraf Gyroscope

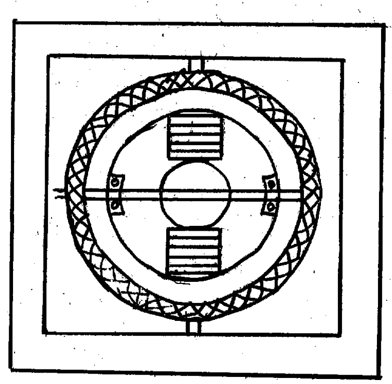
A. Turn and Bank Indicator




B. Markgraf Gyroscope




C. Schematic Sketch of the Gyroscope



not to scale